

# **BUREAU OF AUTOMOTIVE REPAIR**

## **FINAL STATEMENT OF REASONS**

**Hearing Dates:**

June 20 and 22, 2001

**Subject Matter of Proposed Regulations:**

Test-and-Repair Station  
Requirements; Ignition Analyzer

**Section Affected:**

§ 3340.16.5, Title 16, Division 33,  
Chapter 1, Article 5.5, California  
Code of Regulations

**Updated Information:**

The Initial Statement of Reasons is included in the file. The information contained therein is updated as follows:

The capabilities of automotive diagnostic test equipment has expanded and changed considerably over the past several years. Today's modern diagnostic test equipment is much more compact (i.e., hand held, portable) and offers multi-functional capabilities in a single unit. It is not uncommon for one of these new multitasking units to be able to perform many of the diagnostic tasks (i.e., scan tool, voltmeter, ammeter, ignition oscilloscope) that were previously performed by larger, dedicated, single-task units in years past. The smaller, multi-functional units are also much less expensive.

Recently, BAR instituted an enhanced auditing program of Smog Check inspection stations. Part of the audit requires a station to demonstrate to a BAR field representative that they possess acceptable diagnostic test equipment as specified in regulation. Many questions arose from both BAR auditors and station owners alike, about whether the new compact multitasking units met current station equipment requirements. It became clear that the current regulation is too vague, and does not reflect current technology.

Smog check station owners were complaining to BAR management that the requirement for both an ignition analyzer and a digital storage oscilloscope (DSO) was an unnecessary burden, as both devices perform similar functions. Based on the provisions of existing regulations, BAR field representatives were requiring smog check test-and-repair stations to purchase \$15,000-30,000 engine/ignition analyzers, even though newer technology was incorporating many of the same performance characteristics into a DSO. The DSO is also required by regulation, but costs only around \$3,000.

This regulation currently specifies that licensed smog check test and repair stations are required to have a *minimum* compliment of materials, tools, and equipment to be licensed to repair vehicles with emissions related failures. The proposed regulation change would provide clarification of the minimum operating parameters of an ignition analyzer or ignition oscilloscope, and permit some tool requirements to be incorporated into a single, multifunctional

unit that would satisfy both the ignition analyzer and DSO requirements. In addition, the proposed change (as modified) makes it clear that acceptable ignition analyzers and ignition oscilloscopes need not be capable of displaying secondary ignition information for all cylinders at the same time for distributor-less ignition systems. The “all-cylinders-at-the-same-time” requirement applies only to ignition systems that include a distributor.

- This action amends subsection (a) to insert the words “diagnoses and repairs” in lieu of “works on” to clarify the type of operations that may be performed by a Smog Check station.
- This action adds language to subsection (a) that makes clear that Smog Check station equipment may be either separate units, or part of a multi-functional unit.
- This action adds language to subsection (a) to make clear that the materials, tools, and equipment listed in this section are the *minimum* compliment of materials, tools, and equipment a station must have to be licensed by BAR.
- This action amends language to subsection (a)(1)(A)&(B) that defines the minimum operating parameters of an ignition analyzer or ignition oscilloscope and specifies when secondary ignition data must be displayed for all cylinders at the same time.
- This action adds language to subsection (b)(2) to clarify that the required digital storage oscilloscope (DSO) may also be a separate unit, or part of a multi-functional unit that meets some of the equipment requirements noted in subsection (a).

#### **Local Mandate:**

A mandate is not imposed on local agencies or school districts.

#### **Business Impact:**

This action will not have a significant adverse economic impact on businesses.

#### **Specific Technologies or Equipment:**

The proposed action does not mandate the use of specific technologies or equipment.

#### **Consideration of Alternatives:**

No reasonable alternative which was considered or that has otherwise been identified and brought to the attention of the Bureau would be either more effective in carrying out the purpose for which the action is proposed or would be as effective and less burdensome to affected private persons than the proposed regulation.

### **Objections or Recommendations/Responses:**

The following comments/objections/recommendations were made, either in writing or orally at the public hearings, regarding the proposed action:

**1. Glyn Harris, SnapOn Tools, North Hollywood, CA, in oral testimony at the June 20, 2001 hearing, offered the following comments:**

- a. I do support the changes that are being proposed.

*This expression of support was accepted and was considered in the adoption of the proposed action.*

- b. Regarding the secondary ignition requirement in subsection (b), where it talks about firing voltage and spark duration for all cylinders being displayed at the same time in either analog or digital form, I have a question. Analog or digital could be interpreted as the type of equipment or the method used to retrieve signals. My question is, does this need to be displayed as an ignition waveform or as a numeric display?

*This comment/recommendation was rejected because:*

The intent of the language was to allow equipment manufacturers some flexibility in the method that the firing voltage and the spark duration may be displayed on their diagnostic test equipment. The firing voltage and the spark duration may be displayed as either a waveform (analog), or a graphic/numeric representation (digital), such as a bar graph. If a graphic representation is used to display the firing voltage and the spark duration, then the diagnostic equipment must have an accompanying numeric display (digital value) for each engine cylinder. The numeric (digital) values must represent the actual firing voltages and the spark duration of each engine cylinder.

**2. Tim Holloway, Master Tech Institute, Fresno, CA, in oral testimony at the June 20, 2001 hearing, and in oral and written testimony at the June 22, 2001 hearing, offered the following comments:**

- a. I'm opposed to the rule changes. The outlay for additional equipment by the smog shop is not justified. They're spending money for tools they never use. As a trainer, I'm in the shops all the time doing diagnostics for them, and I find most of their high tech tools sitting in the corner someplace collecting dust. Yes, they purchased them to meet BAR requirements, but they're not being used to really solve the problem. Many times I've gone into places and even something as basic and as absolutely necessary as the digital volt/ohmmeters as I have here is not available, and if it is available the batteries are dead. And this is real frustrating because you have to take batteries just to train somebody how to use their own equipment. But having the State mandate what equipment you do or don't have doesn't sit well with me as a trainer because I expect to train these people how to use equipment that they do have that's available at a low cost that will provide adequate answers and is always available. A \$15 test light is much quicker and much

more likely to be used than a \$500 piece of equipment that they don't really understand and don't really want to hook up.

*This comment/recommendation was rejected because:*

The purpose of this regulatory change is to clarify the minimum performance criteria of an ignition analyzer or oscilloscope necessary to repair today's vehicles. In addition, this regulatory change would recognize the smaller, less expensive, multifunctional diagnostic units as meeting those performance criteria. The current regulation already requires the equipment about which Mr. Holloway is objecting. The proposed action does not, in any way, require the purchase of additional or new equipment. It will allow the use of an appropriately equipped digital storage oscilloscope (DSO) to serve in lieu of a larger and more expensive ignition analyzer.

- b. Going around some of the shops in Fresno we've had field agents that have been telling people that they have to have all this equipment now and it's currently law. And I've tossed a field agent who's been a long-time friend of mine out of my shop because I was showing him that this isn't the law yet, and he kept pointing to a memo and saying no, it's the law. I'm telling him no, it's not, and we got into a big hassle over what was the law and what wasn't. And so, if they're going to put things in that aren't even law before we even have hearings, I'm absolutely against it on that basis alone, as well as on the technical basis.

*This comment/recommendation was rejected because:*

The current regulation does require shops to have the basic equipment about which Mr. Holloway is objecting. The proposed action does not, in any way, require the use or purchase of additional or new equipment. California Code of Regulations section 3340.16.5(a)(1) requires Test-and-Repair stations to have an "ignition analyzer/oscilloscope." Section 3340.16.5(b)(2) requires Test-and-Repair stations in enhanced areas to have, in addition to an ignition analyzer/oscilloscope, a device commonly known as a "digital storage oscilloscope" (DSO).

Station owners had been asking BAR whether they must purchase and maintain two separate pieces of equipment in order to comply with the current regulations, or if a multifunctional DSO could serve both functions (ignition analyzer and DSO). After consultation with test equipment manufacturers, emissions instructors, licensed technicians, and others, BAR found that a DSO capable of displaying primary and secondary ignition patterns could also serve as the "ignition analyzer/oscilloscope" required by Section 3340.16.5(a)(1). In effect, the proposed action will recognize the capabilities of the appropriately equipped DSO, and will provide relief to station owners not wishing to maintain two pieces of equipment.

The memo to which Mr. Holloway refers, provided operational guidelines to BAR field representatives, which reduced the regulatory burden on smog check stations by:

- Allowing the DSO to also serve as an ignition analyzer without all the standard, traditional features of an ignition analyzer. That is, the specific display formats of “parade,” “raster,” or “superimposed” were not to be required of a DSO serving the functions of an ignition analyzer.
- Allowing the DSO to display ignition data in digital form rather than the analog form of a traditional ignition analyzer.

The memo was an internal BAR document, directed at BAR field representatives, instructing them to adjust (relax) their enforcement priorities with respect to this issue. It was not intended for public distribution, and was faxed to a smog check station in error.

The memo fixed the problem, as complaints from smog check station owners stopped immediately. The BAR followed up with this proposed regulation change, which has drawn absolutely no comment or objection from smog check station owners.

- c. We need more training and dropping the smog technician examination score to 68 percent is totally unacceptable. I was never consulted on that; I was out of state at that time.

*This comment/recommendation was rejected because:*

This comment is outside the scope of the proposed action. The proposed action only deals with clarifying minimum equipment requirements and recognizing alternatives that are more economical and efficient. Neither the training of technicians nor the technician licensing examination score are subjects under consideration in this proposed action.

- d. I have learned that this regulation change was developed to correct perceived problems with the testing of secondary ignition systems on late model automobiles using direct ignition (DI) systems and coil-on-plug (COP) type ignition systems. The problem simply does not exist. I searched all the manufacturer service information for DI systems and found that no manufacturer requires or recommends the use of any ignition analyzer -- analog or digital -- or any adapter to test and repair their DI systems. BAR’s insistence on using complex and expensive electronic test equipment to measure secondary ignition waveforms is unfounded. Why doesn’t GM, Ford, Chrysler, etc., require their dealers to use them? Is it because they don’t sell equipment?

*This comment/recommendation was rejected because:*

The current regulation requires shops to have the basic equipment about which Mr. Holloway is objecting. The proposed action does not, in any way, require the use or purchase of additional or new equipment. California Code of Regulations section 3340.16.5(a)(1) requires Test-and-Repair stations to have an “ignition analyzer/oscilloscope.” Section 3340.16.5(b)(2) requires Test-and-Repair stations in enhanced areas to have, in addition to an ignition analyzer/oscilloscope, a device commonly known as a “digital storage oscilloscope” (DSO).

Station owners had been asking BAR whether they must purchase and maintain two separate pieces of equipment in order to comply with the current regulations, or if a multifunctional DSO could serve both functions (ignition analyzer and DSO). After consultation with test equipment manufacturers, emissions instructors, licensed technicians, and others, BAR found that a DSO capable of displaying primary and secondary ignition patterns could also serve as the “ignition analyzer/oscilloscope” required by Section 3340.16.5(a)(1). In effect, the proposed action will recognize the capabilities of the appropriately equipped DSO, and will provide relief to station owners not wishing to maintain two pieces of equipment.

As to what GM, Ford, Chrysler, etc., may or may not require, it is irrelevant to the proposed action. The equipment requirement exists in current regulation. All the proposed action does is provide stations an option to purchasing and maintaining two separate pieces of equipment. However, it must be pointed out that BAR technicians, who are intimately familiar with diagnostic and repair publications -- both independent and manufacturer-specific -- confirm that such publications often **do** refer to the use of engine/ignition analyzers, scan tools, oscilloscopes, and DSOs when discussing ignition system diagnostic strategies. In fact, many text books used in automotive repair technical training courses and other educational programs, even refer to the use of such equipment as being the most common and preferred method of quickly and accurately testing and diagnosing ignition systems.

- e. The current BAR-mandated equipment will test primary ignition system waveforms. The well-developed industry proven procedure of grounding secondary voltage spark plugs is accurate, cheap and very effective.

*This comment/recommendation was rejected because:*

Mr. Holloway is correct, the equipment currently required by Section 3340.16.5 -- the ignition analyzer/oscilloscope -- is effective in testing and diagnosing primary ignition systems. The digital storage oscilloscope (DSO) is also effective in testing and diagnosing secondary ignition systems. Current regulation requires both units to be maintained by stations in the enhanced program areas of the state. The ignition analyzer/oscilloscope is a large and comparatively costly piece of equipment and its usefulness is somewhat limited to primary ignition systems. The DSO, on the other hand, can be adapted to fulfill the role of not only the DSO, but the ignition analyzer/oscilloscope as well, and is much less expensive.

The proposed action does not require any additional equipment beyond the “current BAR mandated equipment” that Mr. Holloway mentions. It does, however, provide an alternative to maintaining both an ignition analyzer/oscilloscope and a DSO. It will allow the use of an appropriately equipped DSO to serve in lieu of a larger and more expensive ignition analyzer/oscilloscope.

The procedure Mr. Holloway advocates and refers to is very limited in the amount of diagnostic information it provides the technician, and can lead to an inaccurate diagnosis.

By requiring the ignition analyzer or oscilloscope to display information for **both** the primary and secondary ignition system (i.e., coil and spark plug oscillations, etc.), a technician is able to identify current and emerging problems associated with either system's electronic components. Mr. Holloway's method requires part of the ignition system to be disconnected (i.e., spark plug wire removed from spark plug) in order to attach his device. To correctly diagnose most secondary ignition system problems, the system must remain intact (i.e., attached), and operating as designed by the manufacturer.

- f. This proposal to use complex electronic test equipment to perform simple tests on DI systems will serve only to enrich test equipment manufacturers without providing any greater accuracy in diagnosis, testing and repair of vehicles.

*This comment/recommendation was rejected because:*

The current regulation already requires the equipment about which Mr. Holloway is objecting. The proposed action only relaxes and clarifies the operating parameters of the equipment and allows smaller (i.e., hand held), less expensive devices to be used to satisfy the requirements of this regulation. The proposed action does not, in any way, require the purchase of additional or new equipment. (Please refer to the response to comment 2-b.)

- g. Before forcing changes on the industry, BAR should do a complete study of current auto manufacturer test procedures, equipment specifications, equipment costs, and acceptable manufacturers of equipment, and present this information to the industry in an open forum, maybe the BAR Repair Reporter or the Smog Check Advisory. Let the people who do the tests and repairs every day evaluate the BAR-approved equipment before adopting regulations. The repair industry must be able to make informed choices about the necessity, productivity or cost-effectiveness of anything BAR proposes.

*This comment/recommendation was rejected because:*

The current regulation already requires the equipment about which Mr. Holloway is objecting. The proposed action only relaxes and clarifies the operating parameters of the equipment and allows smaller (i.e., hand held), less expensive devices to be used to satisfy the requirements of this regulation. The proposed action does not, in any way, require the purchase of additional or new equipment. (Please refer to the response to comment 2-b.)

- h. BAR has not subjected the proposed change to scientific study. There has been no peer review. No specifications presented to be evaluated by the industry, and not a single piece of real functional equipment demonstrated.

*This comment/recommendation was rejected because:*

In developing the language for this regulation, BAR, over the past year, has sought the help of automotive educators, repair technicians, BAR field and lab personnel, and

diagnostic equipment manufacturers. BAR invited equipment manufacturers to demonstrate the capabilities of their ignition system diagnostic equipment at BAR headquarters last year. These demonstrations afforded BAR a chance to see the latest advancements in automotive engine analyzer diagnostic equipment. Through these discussions and demonstrations, BAR was able to identify minimum equipment criteria necessary to successfully diagnose ignition system problems (and ignition related emission problems) in today's high-tech vehicles.

The current regulation already requires the equipment about which Mr. Holloway is objecting. The proposed action only relaxes and clarifies the operating parameters of the equipment and allows smaller (i.e., hand held), less expensive devices to be used to satisfy the requirements of this regulation. The proposed action does not, in any way, require the purchase of additional or new equipment. (Please refer to the response to comment 2-b.)

- i. There is a manufacturer-approved, industry-accepted – “for over a hundred years” – method of testing secondary ignition voltage. The equipment is not only inexpensive but readily available and extremely accurate. This method and type of equipment requires no memorization of complicated electronic waveforms or screen presentation setups. It works on all systems with little or no additional equipment and the results are not subject to misinterpretation, even by a poorly trained operator.

*This comment/recommendation was rejected because:*

The procedure and device Mr. Holloway refers to are very limited in the amount of diagnostic information they provide the technician, and can lead to an inaccurate diagnosis. By requiring the ignition analyzer or oscilloscope to display information for **both** the primary and secondary ignition system (i.e., coil and spark plug oscillations, etc.), a technician is able to identify current and emerging problems associated with either system's electronic components. Mr. Holloway's method requires part of the ignition system to be disconnected (i.e., spark plug wire removed from spark plug) in order to attach his device. To correctly diagnose most secondary ignition system problems, the system must remain intact (i.e., attached), and operating as designed by the manufacturer.

The purpose of this regulatory change is to clarify the minimum performance criteria of an ignition analyzer or oscilloscope necessary to repair today's vehicles. In addition, this regulatory change would recognize the smaller, less expensive, multifunctional diagnostic units as meeting those performance criteria. The current regulation already requires the equipment about which Mr. Holloway is objecting. The proposed action does not, in any way, require the purchase of additional or new equipment. It will allow the use of an appropriately equipped digital storage oscilloscope (DSO) to serve in lieu of a larger and more expensive ignition analyzer.

- j. My company would be pleased to conduct statewide training, for a modest charge, for all technicians involved in the smog check test-and-repair industry to present our method of secondary ignition system testing without expensive tools. The State of California, BAR,



could fund this training.

*This comment/recommendation was rejected because:*

This comment is outside the scope of the proposed action. Again, training is not the subject of the proposed action.

- k. If anybody doesn't believe the validity of my system, we'll gladly put on a full-scale demonstration where the BAR or somebody else can bug a whole series of cars, put the BAR's best technicians on it using all the high-tech equipment; we'll use our equipment, and we'll see who wins. I have no doubt who will, because I do this for a living every day and I pound people who have all the high-tech, high dollar equipment that they spend more time hooking up than I do performing the diagnosis.

*This comment/recommendation was rejected because:*

This comment is outside the scope of the proposed action. The proposed action is not about challenges or whose system is better. It is about minimum equipment requirements and providing simple, inexpensive alternatives for satisfying those requirements.

**3. Mike McCormick, Master Tech Institute, Fresno, CA, in oral testimony at the June 20, 2001 hearing, and in oral and written testimony at the June 22, 2001 hearing, offered the following comments:**

- a. Essentially, I concur with everything that Mr. Holloway said. The big thing is, I sold equipment for years, and for years I saw \$20,000-30,000 worth of equipment sitting in shops collecting dust after I sold it. I'd go in and try to train them. They always had something else to do. I've tried to give them support, but they just basically got the equipment because they were supposed to get it, or they needed it for a tax break, or what have you. It just sat there collecting dust.

*This comment/recommendation was rejected because:*

The current regulation already requires the equipment about which Mr. McCormick is objecting. The proposed action only relaxes and clarifies the operating parameters of the equipment and allows smaller (i.e., hand held), less expensive devices to be used to satisfy the requirements of this regulation. The proposed action does not, in any way, require the purchase of additional or new equipment. (Please refer to the response to comment 2-b.)

- b. The biggest problem in this industry right now is the level of competency of the technicians. As the Bureau continues to drop the standards on the smog tests, they're just going to continue to get worse and worse and worse. Not to mention the fact that some of the people that I've seen that have been through various other BAR approved schools and upgrade training and stuff, didn't have a clue. So like I said, equipment doesn't fix cars. It's the human mind and the technician that fixes the cars. The real regulations that

need to be changed are that we need to get the standards up for the technicians' technical ability before we're going to get anywhere.

*This comment/recommendation was rejected because:*

This comment is outside the scope of the proposed action. The proposed action only deals with clarifying minimum equipment requirements and recognizing alternatives that are more economical and efficient. Neither the training of technicians nor the technician licensing examination score are subjects under consideration in this proposed action.

- c. The Bureau has been involved in illegally trying to enforce these rules as law. A Bureau representative who insisted that this was the law and provided a memorandum dated April 4, 2000; from Richard K. Mundy in support of that position confronted Mr. Holloway. The memo directed field staff to begin using draft regulation language (attached to the memo) as operational guidelines when performing initial and periodic smog check station inspections. This was an earlier draft of the proposed regulation change we are discussing today.

*This comment/recommendation was rejected because:*

Smog check station owners were complaining to BAR management that the requirement for both an ignition analyzer and a digital storage oscilloscope (DSO) was an unnecessary burden, as both devices perform similar functions. Based on the provisions of existing regulations, BAR field representatives were requiring smog check test-and-repair stations to purchase \$15,000-30,000 engine/ignition analyzers, even though new technology was incorporating many of the same performance characteristics into a DSO. The DSO is also required by regulation and costs only around \$3,000.

The memo to which Mr. McCormick refers, provided operational guidelines to BAR field representatives which reduced the regulatory burden on smog check stations by:

- Allowing the DSO to also serve as an ignition analyzer without all the standard, traditional features of an ignition analyzer. That is, the specific display formats of “parade,” “raster,” or “superimposed” were not to be required of a DSO serving the functions of an ignition analyzer.
- Allowing the DSO to display ignition data in digital form rather than the analog form of a traditional ignition analyzer.

The memo was an internal BAR document, directed at BAR field representatives, instructing them to adjust (relax) their enforcement priorities with respect to this issue. It was not intended for public distribution, and was faxed to a smog check station in error.

The memo fixed the problem, as complaints from smog check station owners stopped immediately. The BAR followed up with this proposed regulation change, which has drawn absolutely no comment or objection from smog check station owners.

*[Mr. McCormick performed a demonstration of the use of an ignition tester using an ignition system simulator.]*

- d. Car manufacturers have, for years, required their dealers to use a spark tester to test for and diagnose ignition problems or drivability problems. It's a very simple device (*demonstrating*) and costs around \$10. Essentially, what you do to see if you have a problem with your ignition is hook it up and it will tell you if you have an open wire. If you get spark that would indicate that the spark plug wire is intact. That's a very effective test. Furthermore, it will tell you the voltage, up to about 40,000 volts which is more than adequate. So with this simple, inexpensive tool, you can tell the condition of the spark plug wire and the condition of everything in the secondary ignition system as long as the primary ignition system is working.

*This comment/recommendation was rejected because:*

The device Mr. McCormick refers to is very limited in the amount of diagnostic information it provides the technician, and can lead to an inaccurate diagnosis. By requiring the ignition analyzer or oscilloscope to display information for **both** the primary and secondary ignition system (i.e., coil and spark plug oscillations, etc.), a technician is able to identify current and emerging problems associated with either system's electronic components. Mr. McCormick's device, as demonstrated, requires part of the ignition system to be disconnected (i.e., spark plug wire removed from spark plug) to attach his device. To correctly diagnose most secondary ignition system problems, the system must remain intact (i.e., attached), and operating as designed by the manufacturer.

The current regulation already requires the equipment about which Mr. McCormick is objecting. The proposed action only relaxes and clarifies the operating parameters of the equipment and allows smaller, less expensive, and sometimes hand-held devices, to be used to satisfy the requirements of this regulation. The proposed action does not, in any way, require the purchase of additional or new equipment. (Please refer to the response to comment 2-b.)

- e. Once you determine that you have adequate voltage and you still have a misfire, you can put paperclips in the distributor cap, you can even use vacuum line, and you can raise them [*referring to the distance a plug wire could be removed from the paperclip inserted in the distributor cap*] while the car is running, and you can actually do a power balance using the spark tester.

*This comment/recommendation was rejected because:*

The device Mr. McCormick refers to is very limited in the amount of diagnostic information it provides the technician, and can lead to an inaccurate diagnosis. By requiring the ignition analyzer or oscilloscope to display information for **both** the primary and secondary ignition system (i.e., coil and spark plug oscillations, etc.), a technician is able to identify current and emerging problems associated with either system's electronic components. Mr. McCormick's device, as demonstrated, requires

part of the ignition system to be disconnected (i.e., spark plug wire removed from spark plug) to attach his device. To correctly diagnose most secondary ignition system problems, the system must remain intact (i.e., attached), and operating as designed by the manufacturer.

- f. If you have a dead cylinder, you can enrich it with propane. If you still have a dead cylinder, you then run a compression test. If the compression's good and you still have a problem, then you can plug up the PCV system, put propane into the crankcase and then do another power balance. If the cylinder comes to life, you have an internal error. So, every aspect of finding a misfire can be handled with a test light and a spark tester.

*This comment/recommendation was rejected because:*

Mr. McCormick's "spark tester" allows a high voltage spark (4,000 – 100,000 volts), generated by the ignition system, to jump an air gap in the open air of the engine compartment. The use of propane gas in the engine compartment, when this tester is operational could cause an accidental fire or explosion. As mentioned in response to comments 3-d and 3-e, above, this device is limited in the amount of information that it can provide the technician.

- g. Even an inexperienced technician can be taught to use the test light and spark tester method in a matter of no more than about 5 minutes.

*This comment/recommendation was rejected because:*

This comment is outside the scope of the proposed action. Again, training is not the subject of the proposed action.

- h. To do a coil-on-plug (COP) system, you actually have to pull the coil off, put a spark plug in between, and then the spark tester method becomes valid again. This is still just as effective and accurate, but a lot easier and cheaper than using a DIS adapter for an engine analyzer or even a DSO. I don't have any problem with the DSO because that's a very good piece of equipment. It's not as good as a live scope, but a DSO's better than nothing is.

*This comment/recommendation was rejected because:*

The device Mr. McCormick refers to is very limited in the amount of diagnostic information it provides the technician, and can lead to an inaccurate diagnosis. By requiring the ignition analyzer or oscilloscope to display information for **both** the primary and secondary ignition system (i.e., coil and spark plug oscillations, etc.), a technician is able to identify current and emerging problems associated with either system's electronic components. Mr. McCormick's device, as demonstrated, requires part of the ignition system to be disconnected (i.e., spark plug wire removed from spark plug) to attach his device. To correctly diagnose most secondary ignition system problems, the system must remain intact (i.e., attached), and operating as designed by the

manufacturer.

The proposed action will allow the use of an appropriately equipped digital storage oscilloscope (DSO) to serve in lieu of a larger and more expensive ignition analyzer.

- i. The main thing here is that making the shops buy all this more expensive equipment is just enriching the diagnostic equipment manufacturers. Car manufacturers don't refer to anything like this in their documents. If you go in and look up the fault trace for a misfire or excessive emissions, they refer to the test light.

*This comment/recommendation was rejected because:*

The purpose of this regulatory change is to clarify the minimum performance criteria of an ignition analyzer or oscilloscope, necessary to repair today's vehicles. In addition, this regulatory change would recognize the smaller, less expensive, multifunctional diagnostic units as meeting those performance criteria. The current regulation already requires the equipment about which Mr. McCormick is objecting. The proposed action does not, in any way, require the purchase of additional or new equipment. However, it would allow the use of an appropriately equipped digital storage oscilloscope (DSO) as an alternative to the larger and more expensive ignition analyzer.

- j. Car manufacturers realize that testing has to be simple because a lot of people in the industry are not real higher thinkers. When you get into analyzing scope patterns you lose probably 80 to 90 percent of the guys in the field.

*This comment/recommendation was rejected because:*

This comment is outside the scope of the proposed action. The proposed action only deals with clarifying minimum equipment requirements and recognizing alternatives that are more economical and efficient. Training and qualifications of technicians are not subjects under consideration in this proposed action.

**4. David Crippen, Director of Training, Vetronix Corporation, Santa Barbara, CA, in oral testimony at the June 22, 2001 hearing, offered the following comments:**

- a. In looking over the regulation, under subsection (b) it says, "Firing voltage and spark duration of the secondary ignition for all cylinders at the same time, either in analog or digital form." My concern with that part of the regulation is with the new coil-on-plug systems it's very difficult to hook up to those particular vehicles. When the engineers designed them, and I've spoken with many about this, they were designed for misfire detection through the power train control module (PCM). Although some of them are easy to hook up to, others aren't, and the problem I've seen in the industry is that we would have to come up with a lot of different adapters because each year they're designing new types of systems. Presently, there are three ways they can be looked at. They can be looked at as secondary ignition, primary ignition and, in some cases, coil ramping or current ramping. A technician would have to look at which way he wanted to

approach that depending on the configuration of the system, but what is very difficult is to be able to look at them all at the same time. I feel that being able to look at each cylinder individually and then make a comparison, asking yourself is it common to all or unique to a few, along with the information that the PCM will provide should help the diagnostic process to repair these vehicles.

*This comment/recommendation was accepted and the proposed action was modified as follows to accommodate it:*

BAR is aware that most ignition analyzers on the market cannot attach to all the different vehicle ignition systems produced by vehicle manufacturers today without some type of adapter. However, from the responses to its inquiries, BAR staff is confident that there are adequate adapters available in the marketplace to accommodate all the different ignition systems in use today.

BAR recognizes the difficulty in displaying data for all cylinders at the same time for distributor-less (i.e., coil-on-plug and direct) ignition systems. To eliminate any confusion, BAR has modified the proposed regulation language to provide that the specified devices have the capability of displaying secondary ignition data simultaneously for all cylinders only for ignition systems equipped with a distributor. For vehicles equipped with the newer distributor-less (i.e., coil-on-plug and direct) ignition systems, BAR would not require that all cylinders be displayed at the same time, but would expect the shop to use the appropriate tool (i.e., DSO, etc.) to diagnose problems associated with that type of ignition system.

- b. I have found on testing that if an engine analyzer itself couldn't be used that, in most cases, a digital storage oscilloscope (DSO) can be. DSOs usually have the ability to do current ramping and to display waveforms. On many tests that I've conducted I've been able to use foil or an AGI adapter placed near the coil to actually pick out the signal. You can look at the burn time and the oscillations, which are critical in the diagnostic process. I would say that if an engine analyzer wouldn't work that a technician with a DSO could acquire enough information to diagnose a coil-on-plug system.

*This expression of support was accepted and was considered in the adoption of the proposed action.*

The following comments/objections/recommendations were made, in writing, regarding the modified proposed action:

- 1. Tim Holloway and Mike McCormick, Master Tech Institute, Fresno, CA, in an e-mail dated and received August 9, 2001, and in an undated letter received August 10, 2001, offered the following comments:**

Secondary ignition pattern analysis is an obsolete, arcane method of diagnosing problems in spark ignited internal combustion engines. It is slow, inaccurate, unreliable, and easily

misinterpreted by its user.

In the old days, before 5-gas analysis was available, we tried to look into the combustion chamber with electronic eyes, (secondary ignition oscilloscope) to see what was going on. We would mindlessly stare at the spark line and the firing line hoping that we could see the some times minuscule changes that would reveal a problem in the ignition system as a whole, or a specific defect in a given cylinder. It was a high tech solution to a low-tech problem. It was foisted upon us by equipment manufactures that conned us technicians into believing that we could now solve all problems in internal combustion engines with this "Magic Box".

Equipment sellers (con men) told us that even non skilled technicians could diagnose and trouble shoot like the high wage earning master technicians with 30+ years of experience. Look at all the money you will save, raved these "Equipment Pushers." You can fire all your experienced overpaid technicians and hire "Welfare Mommas" from the state supported cheep labor pool. Just look at all the money you will make with this one time expenditure of only \$ 30,000 dollars and, with our easy monthly payment plan, at only 27% interest, we will help you get with the program! As we all know, it didn't work out. Welfare to work people have not replaced experienced technicians, and never will. There is no substitute for training, education and experience in any technical field. And the secondary ignition oscilloscope (the Big Box) sits unused and covered with dust in the corner of every shop that bought one.

We live in the real world of the 21st century. The diagnostic instrument of choice today is the gas analyzer. In its present form (5-gas) it can measure and display hydrocarbons (HC), and oxides of nitrogen (NOx), sort of, down to a one-part-per-million level. It can also measure and display carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), and oxygen (O<sub>2</sub>) down to a one one-thousandth of a percent level. Can any secondary ignition oscilloscope measuring spark firing voltage or spark duration give you this much, or this accurate of information. No it can't, and it never will!

Is there any problem interpreting the results of gas analysis? Can you read the numbers presented on the screen? Can you see the drive cycle traces on your BAR 97 approved smog machine, notice all those colored lines showing the exact gas concentrations at all the varying speed, load, and revolutions per minute, that have been programmed into your state approved machine! Can a secondary ignition oscilloscope analyzer do all that? No it can't!

What is the BAR's fascination with the obsolete, inaccurate, slow to use, secondary ignition oscilloscope analyzer? No automobile manufacture in the world requires their dealership technicians to use this type of equipment, WHY? Why does the state of California even consider the use of obsolete equipment and testing methods? Could it be because its Air Quality Engineers do not have real university degrees in any field of engineering? Is it that these alleged engineers have no current real world experience in testing, diagnosis and repair of modern automotive power plants? Could it be that the BAR testing laboratory is not properly certified to do advanced technological analysis?

As I have stated so clearly before, and demonstrated in your presence, the simple use of a spark gap tester, and a low voltage test light acting as a ground wire - by observing the spark produced by any ignition system with these simple easy to use, easy to understand instruments - a technician can rapidly locate, diagnose and repair problems in any secondary ignition system yet devised.

The California Air Resources Board (CARB) has made the ignition oscilloscope/analyzers even more obsolete and arcane by its introduction of On-Board Diagnostics - Second Generation (OBD2). This system mandates the automotive computer power-train control module/engine control module (PCM/ECM) be able to detect and identify, to a particular cylinder, any type of cylinder miss-fire. This new OBD2 system has been mandated on all new cars sold in California since 1996, regardless of the type of ignition system; even the few that still use a distributor to sort out and deliver the spark to the cylinders.

Why does BAR want to continue secondary ignition waveform analysis on distributor-less, or distributor-equipped vehicles? Do they have to make a rule change just for the sake of change? I believe that the BAR is pushing the newest proposed rule change to cover their illegal implementation of the previous proposed rule change, before it was approved and passed into law. I am referring to Deputy BAR Chief Mundy's memo of April 4, 2000, to all upper level BAR personnel and field enforcement persons. In this memo, Mr. Mundy clearly states that while this rule change has not yet been passed into law yet, all field operatives will immediately begin it's implementation. This implementation has already started, as I was forced to purchase a direct ignition system (DIS) adapter for the smog station where I am employed. Mr. Conrad Diaz, a BAR field representative, told me what brand of equipment to buy and that compliance, as stated in his (Mr. Diaz) station audit report was mandatory. I was told to obtain this equipment before he (Mr. Diaz) returned in two weeks, or he (Mr. Diaz) would shut down my smog check station and cite/fine me for failure to comply with what he (Mr. Diaz) told me was LAW!

The real problem with the diagnosis and repair of automobile power-train systems, is the lack of properly trained and educated (as well as properly paid) automotive technicians. BAR has repeatedly exacerbated this problem by time after time lowering the passing score on its smog license test. Currently you will receive a California Smog Check & Repair license if you pass the state's written, privately administered, test with a score of sixty-eight percent (68%)! A 68% score would earn you a letter grade of "D" in any class I ever taught in the public schools of California, and would not allow any student that received this grade to move to the next higher level of automotive class that I was teaching. I wonder if any California motorist whom already know that their car is the most expensive, and complex appliance they own, would think that this is an adequate level of competence when they entrust their car to a Smog Check shop, for a Smog Check, and related repairs if the car fails.

Do not implement this change!



*These comments/recommendations were rejected because:*

First, these comments are essentially just a reiteration of the comments made by Messrs. Holloway and McCormick at the public hearings. Those comments have already been sufficiently addressed above. Second, these comments do not address or even mention the modified language of the proposed action and are therefore not relevant to the proposed modifications.